REMARKS

Applicants thank the Examiner for the courtesy extended to Applicants' attorney during the interview held April 8, 2003, in the above-identified application. During the interview, Applicants' attorney explained the presently-claimed invention and why it is patentable over the applied prior art, and discussed other issues raised in the Office action. The discussion is summarized and expanded upon below.

The rejection of Claims 1 and 3 under 35 U.S.C. § 102(b) as anticipated by a number of different prior art references is respectfully traversed. These claims have been canceled. OK Accordingly, it is respectfully requested that the rejection be withdrawn.

The rejection of Claims 1, 3-10 and 17-19 under 35 U.S.C. § 103(a) as unpatentable over U.S. 2,701,191 (Laliberte) in view of JP 03-266706 (Yokohama), is respectfully traversed.

The present invention relates to a composition for a polishing pad and a polishing pad using the same, and this polishing pad can be suitably utilized for polishing the surface of semiconductor wafer and the like.

As described in the specification under "Description of the Related Art" beginning at page 1, second paragraph, recent attention has been paid to a method for polishing which can form a surface having high flatness, known as chemical mechanical polishing (CMP). In CMP, polishing is performed by flowing down a slurry, which is an aqueous dispersion in which abrasives are dispersed, to the surface of a polishing pad from an upper side while sliding a polishing pad and a side to be polished. For CMP, the prior art has disclosed the use of a polyurethane foam as a polishing pad, and soluble materials dispersed in a number of resins. Further improvement in slurry retaining properties and polishing rate is required. The present invention is directed to that end.

As recited in Claim 17, the present invention is a composition for a polishing pad which comprises a water-insoluble matrix material containing a crosslinked polymer and an organic water-soluble particle comprising at least one selected from the group consisting of dextrin, cyclodextrin, mannit, lactose, hydroxypropylcellulose, methylcellulose, starch, protein, polyvinyl alcohol, polyvinyl pyrrolidone, polyacrylic acid, polyethylene oxide, water-soluble photosensitive resin, sulfonated polyisoprene and sulfonated polyisoprene copolymer, dispersed in the water-insoluble matrix material.

As described in the specification at page 3, second paragraph, the present invention is the result of studies by the inventors regarding the mechanism by which slurry retaining properties and removal rate are gradually decreased during polishing, and the mechanism in dressing in which a pore is formed (face forming) or updated (face updating) on the surface of the polishing pad with a diamond whetstone and the like. The inventors found that an elongation produced on the surface of the matrix material and thereafter, the surface is deformed plastically, thus choking a pore, and further, dusts of not only the surface of a wafer to be polished but also the matrix material itself are produced, which also choke a pore. The inventors thus discovered that the use of a material having a cross-linking structure and manifesting elastic recovery in a matrix material successfully addresses these problems. Indeed, the importance of using a matrix material containing a crosslinked polymer is shown in the comparative data of record, wherein Examples 1 and 2 are according to the present invention, and Comparative Examples 1 and 2, which employ a non-crosslinked polymer, are for purposes of comparison. The polishing assessment of polishing performance for the Examples and Comparative Examples is described in the specification beginning at the paragraph bridging pages 26 and 27. The results are shown in Table 1 at page 28, reproduced below:

Table 1

	Example		Comparative Example	
	1	2	1	2
Removal rate (μm/min.)	190	250	60	10
State of a pore	○	○	X	X
Breaking elongation (%)	100	100	>600	>600
Breaking remaining elongation (%)	0	0	510	220

Applicants describe the results in the specification at page 29, line 1 through the end of page 30, as follows:

> In order to measure the breaking remaining elongation of matrix materials used in Examples 1 and 2 and Comparative Examples 1 and 2, materials from which a water-soluble particle is omitted from respective Examples 1 and 2 and Comparative Examples 1 and 2 were kneaded and molded similarly to make sheets. The sheets were cut into the dumbbell No. 3 test piece shape shown in JIS K 6251 to obtain test pieces.
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> These respective test pieces were stretched to break at a distance between marked lines of 20 mm, a stretching rate of 500 mm/min. and a test temperature of 80°C according to JIS K 6251, and the breaking remaining elongation was calculated based on the aforementioned standard. In a test piece which did not break even when stretched to a maximum 600%, the piece was forced to cut at this elongation of 600%, and the breaking remaining elongation was calculated. These breaking remaining elongation are also shown in Table 1.
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> From the results of Table 1, in Examples 1 and 2 in which a matrix material is a crosslinked polymer, a pore is formed in the better state even after dressing. The breaking remaining elongation of matrix materials used in these polishing pads were all 0%, and it can be seen that no elongation after breaking is perceived. It can be seen that the removal rate is as high as 190 to 250 μm/min. in such the polishing pad.
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> To the contrary, in Comparative Example 1, a non-crosslinked thermoplastic resin was used as a matrix material. It can be seen that this non-crosslinked thermoplastic resin has the very large breaking remaining elongation of 510% and, therefore, ductility. In addition, a part of pore was choked by dressing. Therefore, the removal rate is 60 μm/min. being 32% of that in Example 1 and 24% of that in Example 2. On the other hand, in Comparative Example 2, since a matrix material used in Examples 1 and 2 is used as a non-crosslinked material, the sample has not the elastic recovery. For this reason, the breaking remaining elongation is as large as 220%. In addition, a part of pore was choked by dressing. Therefore, the removal rate is 10 μm/min., being 5% of that of Example 1 and 4% of that of Example 2.

Laliberte discloses a polishing pad comprising an inherently substantially abrasive-free, resilient substantially non-elastic solid member consisting essentially of vulcanized and plasticized base material, and which material contains a compatible thermoplastic vinyl resin that is substantially uniformly dispersed therethrough, and wherein the member further contains particles of material selected from the group consisting of corn cob, wood flours, cerium oxide and mixtures thereof substantially uniformly distributed therethrough. See Claim 1 therein. Yokohama is drawn to a rubber composition for a tire tread containing particles of a water soluble inorganic compound.

Without the present disclosure as a guide, it is not clear why one skilled in the art would combine disclosures for a tire tread and disclosures for a polishing pad. As described above, the present invention can prevent finely divided pieces scraped from the polishing pad during polishing and during surface renewal or elongation from choking pores. Yokohama is concerned with a tire tread used on cold roads having a temperature around 0°C covered in ice and water, wherein Yokohama's tire has improved ice friction performance without losing abrasion resistance and without generating environmental pollution. What possible reason could there be for one skilled in the art seeking to improve Laliberte go to the art of tire treads? It is submitted that there is no good reason. Nor would one skilled in the art seek to use the tire tread composition of Yokohama to make a polishing pad. Indeed, it is seriously doubted that persons skilled in the art of polishing pads would even go to the tire tread art. Yokohama is nonanalogous art.

Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. In re

Clay, 966 F.2d 656, 658, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992) (copy of record). See also MPEP 2141.01(a). Yokohama fails on both scores, since it is not from the same field of endeavor, and is not reasonably pertinent to the particular problem with which the inventor is involved.

During the above-referenced interview, the Examiner asserted that both Laliberte and Yokohama are concerned with the same problem, i.e., abrasion resistance. Applicants respectfully disagree. Yokohama is concerned with improved ice friction performance without losing abrasion resistance in connection with an automobile tire. Laliberte is concerned with maintaining wear resistance in connection with polishing generally glass articles. These problems are significantly different.

Note also that Claim 17 (and claims dependent therefrom) requires the use of a specific organic water-soluble particle. Yokohama, on the other hand, is limited to an inorganic compound-based particle. Moreover, the corn cob, wood flours and cerium oxide of Laliberte are not organic water-soluble particles.

In the present Office Action, the Examiner fails to respond to any of the above arguments, most of which were previously made. The Examiner simply concludes that "[i]t would have been obvious to incorporate the water-soluble inorganic compounds of Yokohama into the polishing pad of Laliberte in order to enhance abrasion resistance thereby diminishing environmental pollution." While the Examiner has reversed the above two references in the statement of the rejection, the previous arguments are relevant to the present rejection, and should have been responded to.

New Claim 24 (and the claims dependent thereon) are separately patentable, since neither Yokohama nor Laliberte disclose crosslinking with an organic peroxide.

During the above-referenced interview, the Examiner agreed to withdraw the rejection

over Claim 17. Thus, the rejection should also be withdrawn as to Claims 18 and 19, and not applied to new Claims 20-29, which are narrower than Claim 17.

For all the above reasons, it is respectfully requested that the rejection over Laliberte in view of Yokohama be withdrawn.

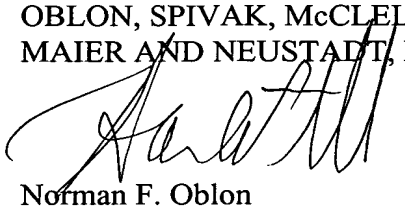
The rejection of Claims 3, 4, 8, 9, 12 and 19 under 35 U.S.C. § 112, second paragraph, is respectfully traversed. Indeed, the rejection is now moot in view of the above-discussed amendment. Accordingly, it is respectfully requested that this rejection be withdrawn.

Applicants gratefully acknowledge the Examiner's allowance of Claims 11-13. Since Claims 30-32 depend on Claim 11, they are patentable as well. Nevertheless, Applicants respectfully submit that all of the presently pending and active claims are in immediate condition for allowance. The Examiner is respectfully requested to withdraw the restriction

requirement, and in the absence of further ground of rejection, pass this application to issue with all pending claims.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER AND NEUSTADT, P.C.



Norman F. Oblon
Registration No. 24,618
Attorney of Record

22850

Harris A. Pitlick
Registration No. 38,779

(703) 413-3000
(703) 413-2220 (fax)

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